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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/673,716

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Thomas G. Thundat

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12/28/2007

UT-Battelle, LLC

Office of Intellectual Property

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EXAMINER

SINES, BRIAN J

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

12/28/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/673,716	THUNDAT ET AL.	
	Examiner	Art Unit	
	Brian J. Sines	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-265 is/are pending in the application.
- 4a) Of the above claim(s) 54-265 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election without traverse of group I comprising claims 1 – 53 in the reply filed on 10/9/2007 is acknowledged.

Claims 54 – 265 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

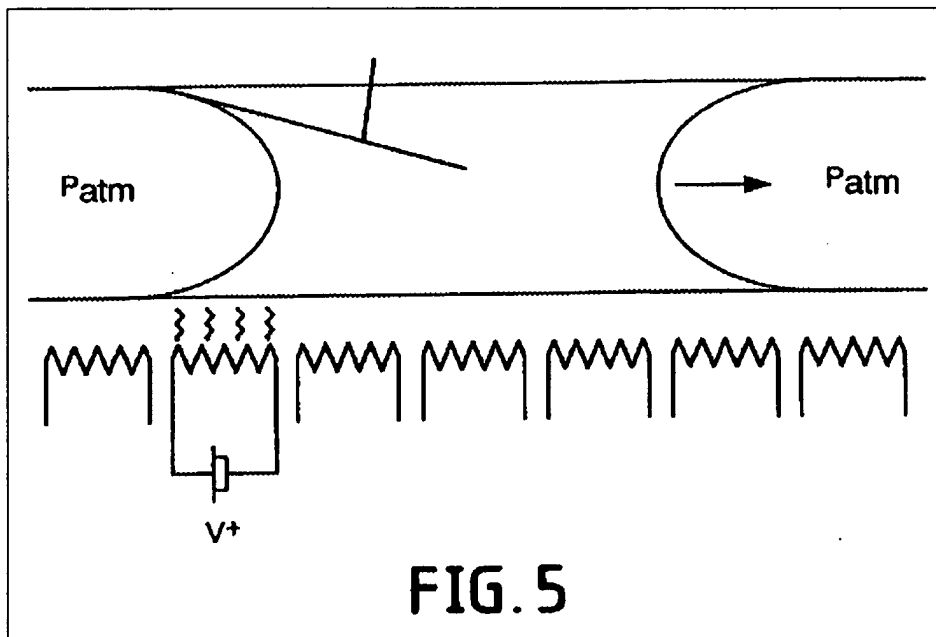
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 13, 18 – 20, 24, 28, 35, 38 and 41 – 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Handique et al. (U.S. Pat. No. 6,130,098; effective filing date: 9/15/1995; patent issue date: 10/10/2000) (“Handique”).

Regarding claims 1 – 3, 19, 20, 35, 41, 42 and 44, Handique teaches an apparatus for transporting fluid microdroplets. The apparatus comprises an enclosed channel comprising a material, such as a silicon (e.g., silicon dioxide), quartz or glass substrate, having a surface for adsorbing fluids, wherein the material is provided with a plurality of individually controllable resistive thermal elements that are arranged in succession along the channel that inherently produce thermal gradients on the surface that produce surface tension gradients at the interface between the fluid and the surface sufficient to cause the fluid to move on the surface through the apparatus (see, e.g., col. 12, lines 30 – 54; col. 13, line 19 - col. 14, line 57; col. 15, line 41 – col.

16, line 39; col. 19, lines 5 – 44; col. 20, line 5 – col. 21, line 33; col. 26, lines 1 – 29; figure 5). Regarding product and apparatus claims, when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (see MPEP § 2112.01). The Courts have held that it is well settled that where there is a reason to believe that a functional characteristic would be inherent in the prior art, the burden of proof then shifts to the applicant to provide objective evidence to the contrary. See *In re Schreiber*, 128 F.3d at 1478, 44 USPQ2d at 1478, 44 USPQ2d at 1432 (Fed. Cir. 1997).

If the prior art structure is capable of performing the intended use, then it meets the claim. Apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function. The manner of operating an apparatus does not differentiate an apparatus claim from the prior art, if the prior art apparatus teaches all of the structural limitations of the claim (see MPEP § 2114 & § 2173.05(g)).



Regarding claims 4 – 12, Handique teaches the incorporation of a regulated power supply (see, e.g., col. 19, lines 63 – 67).

Regarding claim 13, Handique anticipates the incorporation of a controller or means for selecting individual thermal elements for receiving electrical signals for controlling the operation of the disclosed apparatus (see, e.g., col. 28, lines 40 – 49).

Regarding claim 18, Handique anticipates the incorporation of a thermal element 42 protruding from a surface (see, e.g., col. 30, lines 5 – 15; figure 13).

Regarding claims 24 and 28, Handique anticipates the incorporation of thermal or heating elements arrayed as two parallel lines (see col. 19, lines 5 – 14).

Regarding claim 38, Handique anticipates the incorporation of thermal elements comprising aluminum (see col. 19, lines 25 – 30).

Regarding claims 43 – 45, Handique further teaches the incorporation of silicone and polyimide materials that can inherently be either rigid or flexible (see col. 24, lines 1 – 12).

Regarding claims 46 – 50, these claims are considered statements of intended use. The detector that is nearby is not considered a positively recited structure of the claimed apparatus.

Regarding claim 51, Handique teaches that the disclosed apparatus can be integrated with a detector device (see, e.g., col. 22, lines 1 – 5).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 14 – 17, 21 – 23, 25 – 34, 36, 37, 39, 40, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Handique.

Regarding claims 14 and 15, the use of means that comprise, for example, relays, switches, multiplexers or integrated circuits, for facilitating the control of electronic devices is very well known in the art.

The applicant is advised that the Supreme Court recently clarified that a claim can be proved obvious merely by showing that the combination of known elements was obvious to try. In this regard, the Supreme Court explained that, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has a good reason to pursue the known options within his or her technical grasp.” An obviousness determination is not the result of a rigid formula disassociated from the consideration of the facts of the case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not. The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR Int’l v. Teleflex Inc.*, 127 Sup. Ct. 1727, 1742, 82 USPQ2d 1385,

1397 (2007). In this regard, the recited various means for selecting individual thermal elements would provide the predictable result of affording operable control of each of the thermal elements of the disclosed device. Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a controller or selection means as claimed to facilitate the effective control of the disclosed apparatus.

Regarding claims 16 and 17, the incorporation of a series resistor as claimed for facilitating current monitoring and feedback control is well known in the art. Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a series resistor as claimed for facilitating effective current monitoring and feedback control for the disclosed apparatus.

Regarding claims 21 – 23, the incorporation of round or square thermal elements with the disclosed apparatus would have been obvious to a person of ordinary skill in the art. The Courts have held that the change in form or shape, without any new or unexpected results, is an obvious engineering design. See *In re Dailey*, 149 USPQ 47 (CCPA 1976).

Regarding claims 25 – 34, Handique teaches the incorporation of thermal or heating elements arrayed as two parallel lines (see col. 19, lines 5 – 14). The incorporation of curved and dot-shaped thermal elements with the disclosed apparatus would have been obvious to a person of ordinary skill in the art. The Courts have held that the change in form or shape, without any new or unexpected results, is an obvious engineering design. See *In re Dailey*, 149 USPQ 47 (CCPA 1976). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate different shapes or forms of the thermal elements as claimed that would facilitate effective fluid heating and transport.

Regarding claims 36 and 37, Peltier effect junctions is a known functional equivalent to resistive heaters for facilitating heating. The simple substitution of one known element for another is likely to be obvious when predictable results are achieved. See *KSR Int'l v. Teleflex Inc.*, 127 Sup. Ct. 1727, 1742, 82 USPQ2d 1385, 1397 (2007). Therefore, it would have been obvious to further incorporate Peltier effect junctions as claimed to facilitate fluid heating and transport.

Regarding claims 39 and 40, Handique teaches that the disclosed apparatus is a silicon-based semiconductor integrated circuit device using ion implantation (see col. 17, lines 50 – 62). The disclosed device can be fabricated using silicon nitride (see col. 5, lines 43 – 47). The various recited materials, such as titanium-tungsten nitride, are materials well known in the art. The selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art (see MPEP § 2144.07). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate the use of the recited materials in the fabrication of the thermal elements for the disclosed device as claimed.

Regarding claims 52 and 53, Handique teaches that the disclosed apparatus can be integrated with a detector device (see, e.g., col. 22, lines 1 – 5). MEMS microcantilever detectors are well known in the art. Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate the use of an MEMS microcantilever sensor as claimed to facilitate sample analysis.



*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Sines whose telephone number is (571) 272-1263. The examiner can normally be reached on Monday - Friday (11 AM - 8 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brian J. Sines  
Primary Patent Examiner  
Art Unit 1797

